Brief, Why the Launch Equipment Test Facility Needs a Laser Tracker

Background

The NASA Kennedy Space Center Launch Equipment Test Facility (LETF) supports a wide spectrum of testing and development activities. This capability was originally established in the 1970's to allow full-scale qualification of Space Shuttle umbilicals and T-0 release mechanisms. The LETF has leveraged these unique test capabilities to evolve into a versatile test and development area that supports the entire spectrum of operational programs at KSC. These capabilities are historically Aerospace related, but can certainly can be adapted for other industries.

One of the more unique test fixtures is the Vehicle Motion Simulator or the VMS. The VMS simulates all of the motions that a launch vehicle will experience from the time of its roll-out to the launch pad, through roughly the first ½ second of launch. The VMS enables the development and qualification testing of umbilical systems in both pre-launch and launch environments. The VMS can be used to verify operations procedures, clearances, disconnect systems performance & margins, and vehicle loads through processing flow motion excursions.

"Sweating the details"

Any large complex project requires several engineering disciplines to design and build the end product, the VMS is no exception. In general, the foundation was designed by Civil Engineers and built by Craft Labors. The Launch Tower Simulators and the VMS were designed by Structural Engineers and built by Steel Fabricators. The launch umbilicals were designed by mechanical engineers and built by machinists. The key that ties all the disciplines together is tolerance. One-half inch is acceptable tolerance for a concrete foundation, ¼ inch is acceptable tolerance for a large steel structure such as a Launch Tower Simulator, and for the launch umbilicals a tolerance of 1/128 inch would not be unusual. Since the LETF is a test facility and everything has to fit together for the test, one has to account for all the stacked up tolerance in the final test configurations. A highly accurate and versatile instrument for alignment and position verification is needed. A majority of the measurement work is performed outdoors in the Florida sunshine and rain; a compact form factor and environmentally sealed instrument were importance selection criterions for the tracker.

http://kscpartnerships.ksc.nasa.gov/techCap/launchEquip.htm

http://www.nasa.gov/centers/kennedy/news/letf.html

http://www.youtube.com/watch?v=M1x5JiF1iuk